Health Literacy Assessment of University Employees Using the Newest Vital Sign (NVS) Tool

DNP Final Project

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By

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Abstract

The purpose of this DNP quality improvement project was to assess health literacy in a sample of university employees using the Newest Vital Sign (NVS) tool and to evaluate the feasibility of using this tool in clinical practice. An observational, cross-sectional design was used with a convenience sample of 120 university employees visiting an outpatient clinic for onboarding, medical surveillance, or non-urgent care. Health literacy was measured using the NVS, a valid and reliable screening tool that assesses literacy by having individuals interpret a nutrition label. Socio-demographic data were collected and time for NVS administration was measured. On average, university employees were well-educated (M = 16.6, SD = 2.6 years formal education). The majority of participants (83%) had NVS Scores indicating likely adequate health literacy; however, 17% had scores indicating limited or possibly limited health literacy. Non-English native language ($p \leq 0.01$), longer time to complete the NVS ($p \leq 0.001$), and older age ($p \leq 0.001$) were correlated with lower NVS scores. Moreover, non-native English-speaking participants took longer to complete the NVS (M = 2.4, SD = 1.3 minutes) compared to native English-speaking participants (M = 1.9, SD = 0.5 minutes, $p \leq 0.01$). The collective findings suggest that varied selected populations in the workforce can benefit from enhanced health literacy to help them navigate, understand, and use health information/services to improve their health. Implementing "Health Literacy Universal Precautions" to become a "Health Literate Care Organization" is recommended.

Keywords: health literacy, employees, newest vital sign, assessment tool, health literacy universal precautions, health literate care model, occupational health literacy

Chapter 1: Nature of the Project

Introduction to the project

Health literacy is defined as the ability to obtain, process, communicate, and understand basic health information and services in order to make appropriate health decisions (Affordable care act.2014; U.S. Department of Health and Human Services, 2008). Research has consistently shown negative health effects for individuals and society when adequate health literacy is not achieved (Mancuso, 2009). Over twenty years of research shows that health information is often presented in ways that are not usable by most Americans. Almost 9 out of 10 adults have difficulty using routinely available health information obtained from the health care system, media, retailers, and community agencies (Kutner, Greenberg, Jin, & Paulsen, 2006; U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion, 2010). Limited health literacy is associated with poorer health outcomes and non-optimal use of health services as compared to individuals and populations with adequate health literacy (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011).

Limited health literacy is so common that experts advocate that organizations consider health literacy assessment as a "sixth vital sign" to be used in all clinical practice settings (Heinrich, 2012). Importantly, health literacy is lowest among the most vulnerable populations; for example, people with lower education levels, racial/ethnic minorities, uninsured or publicly insured, and older adults (U.S. Department of Health and Human Services, 2008). Additionally, the National Occupational Research Agenda (NORA) has identified employees with poor literacy skills as a population at risk for higher incidence of injuries, illnesses and fatalities (Parks, Chikotas, & Olszewski, 2012). Health literacy is essential for sound decision making and

self-management activities, and thus should be incorporated into all aspects of health system planning and operations to better serve both patients and employees (Koh, Brach, Harris, & Parchman, 2013). Because health literacy is considered essential for improving health outcomes, the U.S. Department of Health and Human Services (DHHS), Healthy People 2020, the Affordable Care Act (ACA), the Joint Commission, the Center for Disease Control and Prevention (CDC), and the Agency for Healthcare Research and Quality (AHRQ) all outline national initiatives for addressing health literacy issues (Affordable care act, 2014; DeWalt et al., 2010; The Joint Commission, 2007; U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion, 2010; U.S. Department of Health and Human Services, 2008). Health literacy enhancement approaches are appropriate for a variety of health care and institutional settings, including populations of employees working in settings. The general population workforce has a variety of health promotion and illness management needs that rely upon adequate health literacy to achieve more optimal health outcomes. Initiatives that help workers improve their occupational health literacy or provide tools to compensate for limited literacy have the potential to improve the health outcomes of individual workers as well as workforce populations. Several successful organizations are using their own employees to test strategies and programs to promote wellness, reduce the burden from chronic disease, and deliver more targeted care for high risk conditions or groups with disparities in order to intervene and address those needs and improve individual and population health outcomes (Birk, 2013).

The Ohio State University (OSU) workforce is representative of the population served by the OSU health system. Most employees use the OSU health system and health plan for their own health care and therefore can serve as a representative population to pilot health system health literacy strategies. However, the health literacy level of OSU employees is not known;

and therefore, determining health literacy levels of OSU employees is the first step toward developing tailored health coaching and programming to help employees reach their personal and occupational health goals.

Purpose

The purpose of this doctorate of nursing practice (DNP) quality improvement project was to assess the baseline levels of health literacy in a sample of OSU employees. Specifically, the two main objectives of this project were to:

1. Evaluate the health literacy of OSU employees during onboarding, medical surveillance activities, and/or routine primary or follow-up care in the University Health Services (UHS) clinic by measuring baseline health literacy levels using the Newest Vital Sign (NVS) tool.

2. Evaluate the feasibility of using the NVS tool in clinical practice by measuring time for tool administration.

Significance of Project to Nursing and the DNP Essentials

The objectives of this health literacy project are consistent with all eight of the DNP Essentials (American Association of Colleges of Nursing, 2006). For example, several nursing, psychosocial and biophysical science-based concepts and theories (Health Literate Care Model) provided the basis for project design (Essential I, Scientific underpinnings for practice). The concept of health literacy originated in the 1970s and 1980s when a gap between health education materials and comprehension/reading ability of patients was identified and subsequently researched (Speros, 2005). The current definition of health literacy is built on health promotion, cognitive, communication, social skill, and decision-making concepts from

multiple disciplines (Mancuso, 2008; Speros, 2005). Moreover, the project objectives generated data that may be used to transition organizations toward becoming health literate health care organizations that ultimately lead to improved health outcomes for employees, individual patients and other populations served (Brach et al., 2012; Koh et al., 2012) (Essential II, Organizational and systems leadership for quality improvement and systems thinking).

Current scientific evidence about health literacy was evaluated during the design phase of this project to inform the choice of valid and reliable tools to assess health literacy in clinical practice (Mancuso, 2009). Moreover, literature reviews of studies linking limited health literacy to poor health outcomes (Berkman et al., 2011) provided the evidence that implementing practice changes in the health care system is an important endeavor, which addressed DNP Essential III (Clinical Scholarship and Analytical Methods for Evidence-Based Practice).

Information technologies in the form of data management and analysis software programs (Microsoft Access, Microsoft Excel, and SPSS) were used in this project for data management and analysis (Essential IV, Information systems/ technology). Addressing health literacy issues is a national health care policy strategy to reduce health disparities and improve individual and population health outcomes (Essential V, Health care policy for advocacy in health care). Moreover, this project was an interprofessional collaborative effort, which is a key component for improving patient and population health and for generating internal organizational data that may serve as a foundation to adapt nationally recommended programming (Essential VI and VII, Interprofessional collaboration and clinical prevention to improve national population health outcomes). Finally, my experience as an advanced nurse practitioner and my advanced knowledge in the area of health literacy and occupational health

were necessary to design and implement this project successfully (Essential VIII, Advanced nursing practice) (American Association of Colleges of Nursing, 2006).

The findings from this DNP project may be used to initiate the conversation among nurses, other health professionals, and administrators about the importance of health literacy and how to implement "health literacy universal precautions", the concept of approaching all individuals as though they are at risk of potentially not understanding or being able to use health-related information (DeWalt et al., 2010), throughout the health care organization. Nurses play essential roles in facilitating patient communication, enhancing individuals' understanding of health information and engaging them in health decision-making and therefore can contribute significantly to the health literacy discussion. Assessing individual driving forces that affect decision-making, identifying barriers to learning, communicating clearly, making health information accessible and usable, adapting health information to the cultural and language needs of the patient, and evaluating comprehension are basic nursing health literacy promotion strategies (C. Speros, 2011). DNP-prepared nurses are especially equipped to lead such a system-wide, evidence-based, patient-centered health literacy initiative that is recommended by national health literacy experts and regulatory agencies and supported by outcomes research (Berkman et al., 2011: Brach et al., 2012; Koh et al., 2012).

Chapter 2: Review of Literature

Conceptual Framework

The conceptual framework supporting the design of this DNP project is based on the Health Literate Care Model (Koh et al., 2013) (see Figure 1 for Health Literate Care Model). This model uses a universal health-literate approach (as outlined in the Health Literacy Universal Precautions Toolkit, DeWalt et al., 2010) combined with the Care Model (formerly known as the Chronic Care Model) (Koh et al., 2013). Health care systems adopting the model have health literacy as an organizational value immersed into all aspects of planning and operations, including self-management support, care delivery design, clinical information systems and shared decision-making support (Koh et al., 2013).

The concept of health literacy has progressed from one rooted in education and social policy in the 1970's, that was defined as the basic ability to read, write, speak, and compute health-related information, to a contemporary definition of possessing a wide array of essential information-processing skills to help one function in society while also recognizing the influence of culture, language, and context. Multiple disciplines including health care, education, library science, public health, mental health, and policy development have helped evolve the concept of health literacy (Mancuso, 2008) and it is now posited that an individual must develop certain skills and abilities in order to attain health literacy competence. In a concept/dimensional analysis, Mancuso (2008) identified the major attributes of health literacy as capacity, comprehension, and communication. Health literacy evolves over one's lifetime and influences individual and societal health outcomes (Mancuso, 2008).

Occupational health literacy is defined as how well workers are able to obtain, communicate, process, and understand occupational health and safety information and services to make decisions about their health in the workplace (Wong, 2012). Occupational health literacy is an important related concept applicable to both individuals and populations of workers that can be addressed similarly using health literacy strategies. Occupational health and policy experts advocate building health literate workplaces (Wong, 2012).

Improving health outcomes depends on individuals' engagement in health care prevention, decision-making, and self-management activities. Health literacy experts promote the use of health literacy universal precautions and acknowledge that the complexity of the health care system challenges everyone. Everyone benefits from clear, actionable information and simple patient education materials (Koh et al., 2013). Strategies incorporating health literacy universal precautions are addressed through interventions described in the 2010 Agency for Healthcare Research and Quality (AHRQ) Health Literacy Toolkit (DeWalt et al., 2010). However, implementing health literacy strategies requires system level changes by organizations and health care professionals (Koh et al., 2012; U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion, 2010). According to the Assistant Surgeon General, limited health literacy is not an individual, but a public health issue that is vital to realizing the national health agenda (U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion, 2010).

Systems adopting the Health Literate Care Model would be able to help people access community resources through strong community partnerships (Koh et al., 2013). The Institute of Medicine (IOM) has recommended that making the commitment to become a "Health Literate Health Care Organization" will not only help the 77 million people who have limited health

literacy but also anyone else who may have difficulty accessing, navigating, or successfully using health services (Brach et al., 2012).

Related Research

Effects of health literacy on health care costs and outcomes.

The annual cost of low health literacy is estimated to be between $106 to $236 billion in the U.S. alone (National Institutes of Health, 2014). A 1992 Arizona study found that annual health costs for Medicare patients with low health literacy were four times higher than those with high health literacy ($13,000 versus $3,000 annually) (National Institutes of Health, 2014). In a systematic review of English language evidence focusing on the effects of health literacy on health outcomes and health care cost, Berkman et al. (2011) reported that low health literacy was consistently associated with more hospitalizations, more frequent use of emergency care, lower rate of mammography screening and influenza vaccination, poorer ability to demonstrate taking medications appropriately, poorer ability to interpret labels and health messages, and, among older adults, poorer overall health status and higher mortality rates. Similarly, an Australian cross-sectional, random population survey of 2,824 people aged $\geq$ 15 years, using the same tool to measure health literacy that was used in the current project, found that less than adequate health literacy was associated with more lifestyle cancer health risks. Survey data also revealed that adequate functional health literacy mediated the relationship between socio-economic status, perceptions of cancer risks and behaviors based on a structural equation model (Adams, et al., 2013).

Adults aged 65 or older exhibit the smallest percentage with adequate health literacy skills compared to other age groups and the largest percentage with below basic health literacy

(Kutner et al., 2006). A longitudinal cohort study of older adults in England reported that one in three were unable to understand basic usage instructions on a medication label and that those with low health literacy (scores in the lowest 12.5%) were more than twice as likely to die within five years compared to those with no health literacy limitations (Bostock & Steptoe, 2012). The investigators concluded that low health literacy was still a significant predictor of mortality after adjusting for measures of cognitive function (Bostock & Steptoe, 2012). While most health literacy studies have focused on the evaluation of individuals reading print materials, patients' ability to recall spoken health instructions can also be problematic, especially for older adults (McCarthy et al., 2012). For example, McCarthy et al. (2012) found that regardless of the literacy level of older adults, recall of spoken health instructions was poor (28%) for signs and symptoms of infection and when to take medication (40.5%). They also found overall that older adults with low or marginal health literacy had significantly poorer ability to recall spoken health information than those with adequate health literacy (McCarthy et al., 2012).

Children of parents or guardians with less than adequate health literacy have also been identified as a population with poorer health outcomes. For example, a cross-sectional study of a representative sample of 6100 parents from the 2003 National Assessment of Adult Literacy analyzed performance on 13 child health-related tasks to explore the role of parent health literacy in resolving child health disparities. The researchers found that 28.7% of the sample had below-basic/basic health literacy, 68.4% were unable to enter names and birth dates correctly on an insurance form, 65.9% were unable to calculate the annual cost of a family size-based health insurance policy, and 46.4% were unable to perform at least one of two medication-related tasks (Yin et al., 2009). Yin et al. (2009) concluded that a large proportion of U.S. parents have limited health literacy skills and that decreasing literacy demands by simplifying insurance and

other medical forms, as well as medication and nutrition labels, is required to decrease health care access barriers and promote informed parent decision making. Addressing health literacy issues may lower health care costs by helping improve health outcomes and reducing health disparities.

Strategies to reduce health literacy demands and improve health outcomes.

Although evidence is limited, studies have shown that health outcomes can be improved by reducing the health literacy demands on patients (Koh et al., 2013). For instance, Roter (2011) described oral health literacy demand as including language elements such as medical jargon, language complexity, language context, and structural characteristics of dialogue, and proposed ways to decrease literacy demand and enable better health care interactions with patients. The three main strategies proposed included: a) "strip it down" (decrease medical jargon and complex general language), b) "bring it home" (communicate information by relating it to the patient's prior experience), and c) "mix it up" (chunking information and checking frequently for patient understanding) to better help patients fully engage in their own health care (Roter, 2011).

Cloonan et al. (2013), in a review of the readmission literature, identified successful strategies to address low health literacy to reduce 30-day hospital readmissions, in part, to avoid anticipated Affordable Care Act sanctions. Study data suggested that characteristics of at-risk patients for readmission are similar to those with low health literacy and that successful strategies that addressed both issues included: a) improving the discharge process by starting early; b) using the teach-back method; c) using jargon-free, unhurried verbal communication; d) using simple, understandable, and illustrated written materials; e) making follow-up phone calls

with targeted messages; and f) involving family and/or other caregivers to help coordinate care (Cloonan, Wood, & Riley, 2013).

Other strategies to reduce health literacy demands include the use of illustrated daily medication cards, which was reported to improve medication self-efficacy and adherence among at-risk elderly patients in a community setting (Martin, Kripalani, & DuRapau, 2012). Additionally, researchers conducting a 12- month randomized controlled trial (RCT) with 123 heart failure patients reported that a primary care self-management program for heart failure patients with low health literacy using picture-based educational materials and other health literacy approaches reduced the risk of hospitalization and death (DeWalt et al., 2006). Similarly, another RCT evaluating 77 chronic obstructive pulmonary disease patients with low and higher health literacy reported that both groups benefited from a literacy-sensitive self-management intervention (Kiser et al., 2012). Moreover, combining literacy-appropriate diabetes education with brief counseling resulted in positive psychological and behavioral changes across literacy levels in a pilot diabetes self-management program (Wallace et al., 2009). The evidence is strong that reducing health literacy demands in various patient populations leads to improvements in health outcomes; however, there is also evidence that other populations will benefit from improved health literacy, such as employees of organizations (e.g. hospitals, factories).

Occupational health literacy issues.

Assisting employees who have lower health literacy levels can help them avoid serious consequences of limited literacy while on the job. For example, studies have shown that accidents related to chemical exposures can be reduced if employees are instructed how to

obtain, process, and understand basic health information such as that found on a Material Safety Data Sheet (MSDS) (Bouchard, 2007). More than 30 million U.S. workers are exposed to hazardous chemicals in the workplace. A cross-sectional study assessing workers' literacy levels and their ability to comprehend a MSDS for sodium hypochlorite (a commonly used chemical that causes work-related health effects such as asthma and eye/throat irritation), found a positive correlation between health literacy scores and MSDS comprehension scores (Bouchard, 2011). Similarly, the agricultural and forestry industries report the need for better industry strategies for safety training with a culturally and linguistically diverse and potentially educationally limited workforce. The adoption of educationally, culturally, and linguistically appropriate health and safety training is likely to lead to better personal and occupational health outcome for workers (Arcury, Estrada, & Quandt, 2010). Additionally, some employees may need and benefit from simplified versions of traditional forms and health-related materials, while others may require very detailed, personalized assistance regarding self-management health improvement strategies (e.g. the use of health coaches, interpreters and/or navigators, picture cards, individualized hands-on teaching by health professionals) to assist them in overcoming barriers to understanding, navigating, and utilizing the health system. In both contexts (personal health care, occupational health and safety), health literacy issues are highly significant targets for interventions/programs to support the needs of those who have limited health literacy. Because inadequate health literacy is prevalent in all segments of society, nurses and other health professionals need to be able to assess and assist those at-risk individuals (Speros, 2005).

In context of these described priority needs, this DNP project was designed to assess the health literacy level of university employees as an initial step to improve their health outcomes. In a previous study that implemented a system change to incorporate health literacy screening

into clinical assessment and electronic health record (EHR) documentation for inpatient and primary care patients, the investigators found that such screening was indeed feasible (Cawthon, Mion, Willens, Roumie, & Kripalani, 2014). The NVS tool was selected as the health literacy screening tool for this project based on its established clinical use and expert recommendation (Weiss et al., 2005; Cornett, 2009; Speros, 2011; Heinrich, 2012).

The Newest Vital Sign (NVS) Tool.

The NVS tool was developed by Weiss et al. (2005) to be a suitable quick and accurate screening tool for limited health literacy in primary health settings. The NVS instrument that was used in this project has been compared to the most common used health literacy assessment tools, the Rapid Estimate of Adult Literacy in Medicine (REALM) and the Test of Functional Health Literacy in Adults (TOLFHLA). The REALM tests the subject's ability to recognize and pronounce words, while the TOLFHLA tests the subject's ability to read and comprehend text and perform computations involving health-related tasks (Osborn et al., 2007). Osborn et al. (2007) compared the NVS to the REALM and short version of the TOLFHLA (S-TOLFHA) and confirmed that the NVS was able to identify those with limited literacy skills, but was less effective at identifying those with adequate skills than the REALM and S-TOLFHLA. The NVS was less effective than the TOLFHLA at predicting health outcomes. In a study analyzing the perceptions of patients being screened for limited health literacy with the NVS, 97% recommended the clinical screening by using the tool (VanGeest, Welch, & Weiner, 2010). VanGeest et al. (2010) also found that even patients with the lowest levels of health literacy were comfortable and supportive of clinical health literacy screening. Another study looked at the time and cost constraints associated with NVS screening for health literacy in a primary care clinic and found that although the cost of using the NVS in clinical practice was relatively small,

additional staff reinforcement may be needed to assist patients with the NVS tool, tally scores and then, importantly, convey the findings to the healthcare providers (Welch, VanGeest, & Caskey, 2011). The NVS tool was selected for this project due to the average three minute administration time, the ease of use in clinical practice, and expert recommendation from the literature and colleagues of the author.

Chapter 3: Methods

Project Design

This project used an observational, cross-sectional design with a convenience sample of 120 new and existing OSU employees who visited University Health Services (UHS) for onboarding, routine care, or medical surveillance activities. UHS is an out-patient clinic for university employees located on the OSU campus in the Medical Center complex in Columbus, OH. The investigators obtained OSU Institutional Review Board (IRB) approval of this project, (exempt status). (See Appendix A for project protocol).

Sample

All adult OSU employees, age 18 or older, who presented to the UHS clinic for post-offer employment screening, medical surveillance activities, or routine care; were eligible to participate in the project. Employees who were less than 18 years of age were excluded due to potential issues with legal consent. Employees who presented to the clinic for care of an acute injury or illness were excluded to prevent delays in evaluation and treatment. Sample size was determined by the number of subjects consenting and able to participate in the study during the times the investigator was collecting data at the UHS clinic [1-3 days/week for 8weeks, (N =120)]. This delimited sampling plan and obtained sample size were consistent with the overall needs assessment approach taken for this project, in which there was a primary goal to obtain initial data on extent of need to inform subsequent planning of quality improvement initiatives pertaining to health literacy at the UHS clinic.

Methods

Each employee checking in to the UHS clinic for onboarding or medical surveillance was informed of the opportunity to participate in the study by front desk staff using a scripted invitation. Front desk staff members were trained to use the notification of project script by the co-investigator (Appendix B). Employees who expressed interest in participating were offered an informational flyer (Appendix C) and were directed to see the DNP student seated in the waiting area for further information. The DNP student took the potential subject to a private interview area, verified participant eligibility (see Project Eligibility criteria, Appendix D), explained the study using a script (Appendix E), allowed time for questions, and obtained verbal informed consent from interested individuals. Verbal consent was preferred so that no project documents contained the participant's name. Participants were informed that they could withdraw from the study at any time without penalty. The participant was able to keep the project flyer that contained Principal Investigator, DNP student and Office of Responsible Research contact information.

After consent was obtained, the DNP student collected demographic data via interview, recorded the information on the health information data collection form (see Health Information Data Collection Form, Appendix F), verbally administered the NVS tool and recorded how long it took for participants to complete the process (see NVS Instructions, NVS Label, and NVS Score Sheet; Appendices G, H, and I). Training for administering the NVS tool was found in the free implementation guide available on the Pfizer NVS toolkit website (www.pfierhealthliteracy.com, 2011). The data collection form and NVS scoring sheet were stapled together and placed in an envelope that was kept in a locked drawer at the clinic until data entry into a Microsoft Access database (which was encrypted and password protected). At

the time of data entry, a unique identification number was automatically assigned to the data set for each individual participant. Any data transfers were encrypted. Any print copies of data will be shredded upon study completion or as per established College of Nursing and university policies for records retention. Demographic and NVS data were used for data analysis. Based on current clinic volume statistics, previous survey initiatives and investigator availability for data collection, approximately 8 subjects per day were expected to participate in the project. The DNP student piloted the project procedures, including administration of the NVS tool, with coworkers and peers prior to implementing the study.

In addition to seeking OSU IRB exempt approval for the project, the proposal was submitted to UHS medical and administrative leaders and the OSU human resources administration for review. It was projected that data collection could be completed within a 14-week timespan (academic semester) and that data analysis and interpretation of the findings could be completed within an additional 14-week timespan. If there had been any unanticipated issues with recruitment efforts in the UHS, an alternate site would be considered. There was only a slight risk of a confidentiality breech that was minimized by protocol safeguards. Due to the nature of this project as a descriptive needs assessment of the employee population and feasibility pilot for the use of the NVS tool in practice, data analysis could have been performed on any cross-section of the employee population and still show merit for the purpose of this project.

Instruments

Demographic data were collected verbally and recorded on the Health Information Data Collection Form developed by the author/DNP student (Appendix F). Only general demographic

information (age, gender, native language, years of education, job title, whether new or existing employee) were recorded in order to avoid responses that could potentially make individuals identifiable from their responses.

Health literacy data were collected using the NVS tool. The NVS is a bilingual screening tool that identifies patient risk for low or limited health literacy based on interpreting an ice cream nutrition label and can be administered in approximately three minutes in a clinical setting (www.pfizerhealthliteracy.com, 2011). The six-question tool was developed by Weiss et al. (2005) as a quick, accurate screening tool for identifying limited health literacy for clinical use with English and Spanish-speaking patients. The English version of the tool was used in this project. The health literacy skills measured by the NVS include the understanding and use of words (prose), numbers (numeracy), and forms (documents) (www.pfizerhealthliteracy.com, 2011). The NVS was compared and found to correlate with the longer established TOFHLA (test of functional health literacy assessment) tool. Internal consistency was established using Cronbach's alpha ($\alpha = 0.76$), criterion validity ($r = 0.59$) with area under the ROC (receiver operating curve) of 0.88 for the English version (Weiss et al., 2005: Mancuso, 2009). Scoring 0 – 1 on the NVS suggests a high chance of limited health literacy, 2 - 3 suggests possible limited literacy, and 4 - 6 indicates almost always adequate health literacy (www.pfierhealthliteracy.com, 2011).

Participants in the current project provided verbal answers to the questions asked by the DNP student about an ice cream nutrition label (see Appendix H) from the NVS Score Sheet (Appendix I). The NVS score was tabulated on the NVS Score Sheet and also recorded on the Health Information Data Collection Form.

Feasibility of using the NVS in clinical practice was determined by measuring the actual time for tool administration and recording the total administration time on the Health Information Data Collection Form. The time for administration/completion of the NVS tool was determined by using the stopwatch function on the DNP student's iPhone 4. The timer was started when the participant was given the ice cream label to view and was stopped when the participant completed answering or was unable to answer the sixth/final question on the NVS Score Sheet. The time for completion was also recorded on the Health Information Data Collection Form. The time was recorded in minutes, seconds, and hundredths of seconds, but converted to minutes for data management. The NVS tool developers indicate that the tool can be administered in only three minutes (www.pfizerhealthliteracy.com, 2011). Providers and staff at the UHS clinic stated that the NVS tool administration time would need to be less than five minutes for them to consider including it in initial intake appointments for employee patients.

Data Analysis

Demographic (age, gender, native language, years of formal education, job title, new or existing employee) and NVS (score and time to complete) data for each subject were entered into a Microsoft Access database by the DNP student and secured per OSU data security policy. The data were converted into a Microsoft Excel spreadsheet and analyzed using IBM SPSS version 21. Data were then summarized in tables and descriptive statistics were used for analysis (e.g. cross tabulations, t-tests and Pearson bivariate correlations). The age of the participants, NVS scores, years of formal education, and time to complete the NVS tool were treated as continuous variables. Gender, native language, job type (medical or non-medical), and job status (new or existing employee) were treated as categorical variables.

Chapter 4: Findings

Results

Participant characteristics.

The mean age of the university employee participants in the current project was 36.7 years (*SD* = 13.3, range 19-74 years) and the mean years of formal education was 16.6 (*SD* = 2.6 years, range 12-24 years). The sample consisted of 46.7% male employees and 53.3% female employees. Eighty-nine percent self-reported English as their native language and 11% self-reported another language as their native language. Participants self-reported job titles which were recorded by the DNP student and then categorized as "medical" or "not medical" (43.3% medical, 56.7% non-medical). Eighty-one percent of the participants were existing employees and 19% were new employees (See Table 2 for socio-demographic characteristics of the sample).

NVS Scores.

The mean NVS score for the group was 4.76 (*SD* = 1.32, score range 0-6). NVS scores were also aggregated into three groups: scores of 0 or 1 indicating limited health literacy (2.5%); scores of 2 or 3 indicating possibly limited health literacy (14.2%); and scores of 4, 5, or 6 indicating adequate health literacy (83.3%) (See Table 3 for the counts for the categorical variables). One participant did not complete the NVS tool due to vision problems which prevented him from clearly viewing the nutrition label.

Bivariate relationships were analyzed using Pearson product-moment correlations between the continuous variables: NVS score, time to complete the NVS, age, and educational

level (see Table 4). Educational level correlations did not achieve statistically significance. However, longer time to complete the NVS ($p \leq 0.001$) and older age ($p \leq 0.001$) were correlated with lower NVS scores.

Bivariate relationships for the categorical variables (employment status, gender, job type, and native language) were analyzed using t-tests. (See tables 5 through 8 for summaries of the data from tests of group differences). Non-English native language ($p \leq 0.01$) was correlated with lower NVS scores. NVS scores were lower for non-English native speaking participants ($M = 4.2$, $SD = 1.2$) compared to native English-speaking participants ($M = 4.9$, $SD = 1.3$, $p \leq 0.01$), and non-English native speaking participants took longer to complete the NVS ($M = 2.4$, $SD = 1.3$ minutes) compared to native English-speaking participants ($M = 1.9$, $SD = 0.5$ minutes, $p \leq 0.01$). No significant differences emerged between medical and non-medical job types relative to NVS scores or NVS completion times.

Time for NVS Administration

The mean time to complete the NVS tool was 1.97 minutes ($SD = .55$, range 1.07 - 3.35 minutes).

Discussion

The data from this quality improvement project suggest that university employees have variable levels of health literacy and that potential for negative health outcomes could exist. These findings are aligned with previous studies recommending the use of "health literacy universal precautions" throughout healthcare organizations (DeWalt et al., 2010; Koh et al., 2013). Adopting health literacy universal precautions means that all individuals in the healthcare organization should be approached as though they are at risk of not understanding their health

status or how to manage their health or self-care issues (Koh et al., 2013). Although most employee participants (83%) in the current project were classified by their NVS score as having "likely adequate health literacy skills", 17% had scores that indicated "limited" (2.5%) or "possibly limited" (14.2%) health literacy. Moreover, the data suggest that health literacy levels cannot necessarily be predicted by socio-demographic characteristics in this population. For example, some higher educated (≥16 years of formal education) and native English-speaking individuals had "limited" or "possibly limited NVS scores". Although some populations are not generally considered at high risk for limited health literacy, there are individuals within those populations that may struggle routinely or situationally with health literacy issues (Koh, 2013).

Data from the current project also suggests that non-English native language ($p \leq 0.01$) participants are at higher risk for limited health literacy. Although socio-demographic characteristics cannot always predict health literacy levels, several studies have reported that non-English native language employees are at higher risk for low health literacy as well as for cultural barriers to full patient engagement (Arcury, Estrada, & Quandt, 2010). Limited English proficiency, cultural differences, and limited health literacy have been called the "triple threat" to effective health communication by The Joint Commission (Singleton & Krause, 2009). The National Assessment of Adult Literacy (NAAL) also reported that adults who spoke a language other than English before starting school, had lower average health literacy scores than adults native English-speaking before starting school (Kutner, Greenberg, Jin, & Paulsen, 2006).

In addition to non-English native language, older ($p \leq 0.001$) participants in the current project were found to be at higher risk for limited health literacy too, which are also findings similar to previous studies. For example, the NAAL reported that almost 59% of adults over age 65 have difficulty comprehending even the most everyday health information (Kutner,

Greenberg, Jin, & Paulsen, 2006). Moreover, Smith et al. reported that almost 40% of older adult participants in their study expressed moderate to severe difficulties in understanding basic health information (2014). Additionally, Deniger, Troller, and Kennelty (2015) reported that 30.8% of geriatric 30-day hospital readmissions were attributed to health literacy deficits or refusal for higher levels of care. These collective findings have implications for senior health care system engagement, especially when so many health transactions such as scheduling, records requests, insurance and financial assistance forms, as well as general health information, are moving to online only formats (Smith, Nolan, & Knehans, 2014). Furthermore, specific to the OSU workforce, a 2011 study (Berkman, Sheridan, Donahue, Halpern, & Crotty) reported that some OSU employees do not speak English as their native language, have low socio-economic status (SES), or are older adults which put them at increased risk for low or limited health literacy. Identifying employees and patients with limited health literacy will enable health care providers to tailor patient/employee communication and health information to the individuals' preferred methods, improve patient engagement, and link these individuals to additional, appropriate resources in order to improve their health and safety outcomes. The potential importance of the findings for this initial sample of OSU employees is substantial in context of overall population trends toward increasing cultural and linguistic diversity as well as the aging of the population and workforce in healthcare settings.

In this project the average time for NVS completion was less than two minutes, which met staff recommendations that tool administration take less than five minutes, and no participants elected to stop the tool once initiated. Anecdotally, no participants expressed feelings of shame or discomfort while taking part in the project or completing the NVS tool, however a few participants expressed surprise that the NVS tool involved math and stated that

their math skills were “rusty”. One participant stated that she could not answer two of the items without a calculator and passed on those items. These opinions expressed by participants during tool administration are aligned with a previous study that evaluated patients’ perceptions of having their health literacy assessed during a routine office visit, and reported that over 98% were willing to be assessed without a reduction in satisfaction scores (Ryan et al., 2008). Thus, the NVS appears to be feasible for use in assessing health literacy in time-constrained settings such as the UHS clinic. Patterns of missing responses or questions that are declined to be answered or skipped can also be analyzed in regard to the specific issues that these may represent in relation to health literacy.

Although screening for health literacy levels is not typically done in many healthcare settings except for research purposes, most studies using the NVS have found it feasible to use in outpatient clinical settings. For example, one study reported that the NVS took approximately three minutes to administer and was easily accomplished during an initial primary care patient encounter (Heinrich, 2012; Weiss et al., 2005). It has also been used successfully in many adult clinics and in patients with: cancer (Adams et al., 2013), chronic pain (Devraj, Herndon, & Griffin, 2013), health information seeking behaviors (Gutierrez, Kindratt, Pagels, Foster, & Gimpel, 2014), and obstructive sleep apnea (Li et al., 2014). Welch, VanGeest, and Caskey (2011) reported only minimal time and cost (primarily training salary costs) associated with the clinical use of the NVS, but recommended training reinforcement for staff as implementation moved beyond the pilot phase. Recently, the NVS has also been successfully used with parents, adolescents, and even children as young as seven years old in the same time frame and with similar results as the adult studies (Driessnack, Chung, Perkhounkova, & Hein, 2014).

In a pilot program conducted with 287 new employees at The Ohio State University Wexner Medical Center (OSUWMC) between March and June of 2012; 129 (45%) were considered overweight [body mass index (BMI) 25-29.9] or obese (BMI > 30), 15 (5%) had high blood pressure, 31 (10%) had elevated glucose levels, and 46 (16%) had no health insurance at the time of hire (Health and Wellness On-boarding Pilot Project Summary, 2012). Health literacy was not assessed as part of the biometric screening process at that time, but there was an obvious need for full engagement in preventive and self-management behaviors by many at-risk employees. Based on findings from this project and previous studies, the NVS could either be added to the current on-boarding biometric process and/or incorporated into an initial employee or primary care appointment.

In order to successfully improve health outcomes, employees in the healthcare system must be fully engaged in preventive practices, decision-making, and self-management activities, which require adequate levels of health literacy (Koh et al., 2013). Thus achieving adequate levels of health literacy is crucial because lower levels are associated with poorer occupational health outcomes such as workplace injuries. If health care providers are aware of the health literacy level of individual patients they can better target their communication appropriately (Heinrich, 2012). Similarly, targeted communication from human resource personnel, job-training educators, and supervisors can potentially benefit the health and safety of their employees. The adoption of educationally, culturally, and linguistically appropriate health and safety training is likely to lead to better personal and occupational health outcome for workers (Arcury, Estrada, & Quandt, 2010). Additionally, some employees may require very detailed, personalized assistance regarding self-management health improvement strategies (e.g. the use of health coaches, interpreters and/or navigators, picture cards, individualized hands-on teaching by

health professionals) to assist them in overcoming barriers to understanding, navigating, and utilizing the health system.

Patient-centered, focused communication is important for all, but it is crucial to reach patients and employees with limited health literacy (Speros, 2011). The project findings may provide evidence that will encourage OSUWMC to adopt universal health literacy precautions and help advance the organization's evolution into a health literate health care system (Koh et al., 2013). DNPs with strong backgrounds in interprofessional collaboration, strategic management, patient-centeredness, and translating evidence into practice are poised to lead this organizational initiative.

Chapter 5: Conclusions

Summary of Findings/Conclusions

This project reports that, on average, university employees in the sample were well-educated and the majority had adequate NVS scores; however, a subset (17%) had scores indicating limited or possibly limited health literacy**.** Non-English native language, longer time to complete the NVS, and older age were correlated with lower NVS scores. NVS scores were lower for native non-English-speaking participants compared to native English-speaking participants, and non-English speaking participants took longer to complete the NVS compared to English-speaking participants. The overall findings show that there is potential for health literacy issues for any employee that may not necessarily be readily identified unless a formal assessment such as the NVS is used in the appropriate contexts. DNPs can use this internal data along with the best health literacy evidence to advocate for the adoption of health literacy universal precautions in employee/occupational health care.

Limitations and Strengths

This project was designed as an initial step to gather internal data to assess the potential need for a larger health literacy quality improvement initiative at the UHS clinic and potentially other similar employee settings at OSU. Although the project findings parallel those of several health literacy studies and systematic reviews on the topic, there were a few limitations. Because the data were collected by the DNP student as part of a DNP scholarly project, a convenience sample of employees visiting a single clinic during a one-time 10-week timeframe was used, which limits the generalizability of the findings. Most new OSUWMC employees go to a different clinic for their on-boarding medical screening and many seasonal or remote location

employees do not generally visit the UHS clinic during late autumn. Additionally, enrollment into the project was voluntary, so the health literacy status of those who chose not to participate is unknown. Another limitation of this project was that the Spanish version of the NVS tool was not offered to the two native Spanish-speaking participants because the DNP student does not read and speak Spanish. Thus it is not known whether these participants' scores might have been higher if the tool had been administered in their native language.

Although there were some limitations to this project, there were multiple strengths of the project, including the ability to compare obtained results with other previously-completed studies. For example, the findings of this project that focused on assessing health literacy in a small sample of OSU employees were similar to those of more rigorous studies. Moreover, this project found that a baseline health literacy assessment was feasible during a routine primary care or occupational health visit, as evidenced by the NVS tool administration times being similar to those reported in the literature (2 – 3 minutes on average) (Welch, VanGeest, & Caskey, 2011; Weiss, 2005). Finally, the data generated from this project showed that some individuals without any obvious risk factors had NVS scores indicating low or limited health literacy, thus emphasizing the importance of using health literacy universal precautions with all employees and patients in the university healthcare organization (DeWalt et al., 2010).

Implications for Nursing Practice and to the DNP Essentials

The findings from this project show that there is a need to evaluate health literacy in employees of the OSU as an initial step to improve health outcomes in this population. Subsequent steps involve making system-wide changes to address health literacy burdens and adopting the Health Literate Care Model (Koh et al., 2013) to guide the process of making those

changes. Limited health literacy has become a major public health issue in this century and encumbers individuals, the health care system, and society. It has been estimated that only 12% of Americans are considered proficient at essential tasks to successfully navigate the health care system and use/act on health information (Kutner et al., 2006). However, even a well-educated workforce, as well as most other patient populations, can benefit from strategies to address health literacy. Such strategies can help all individuals navigate, understand, and use health information and services to improve their health.

Current and future nurses need to recognize and know how to address health literacy issues (Cornett, 2009) and DNP-prepared nurses are equipped to lead the efforts. It is important for nurses to know that even individuals who read well, are comfortable using numbers and forms, and have professional level types of employment can nonetheless face health literacy challenges when they are not familiar with medical terminologies or how their bodies work, have a serious illness, are frightened, have temporary or long-term cognitive impairment, or have conditions that require complicated care regimens. The extent to which nurses and other health professionals can effectively communicate with individuals who have health literacy challenges depends on their ability to recognize potential problem and their capacity to create patient-centered, shame-free strategies to address the issue (Cornett, 2009). Like Cornett (2009), this author advocates integrating health literacy concepts into nursing and interprofessional curricula. Additionally, it is postulated that the university health system evaluated in this project can benefit from implementing health literacy strategies that can move it toward becoming a health literate care organization for patients and the community and a health literate workplace for staff (Wong, 2012). Employees also benefit from clear, simple communication and training in an employee-centered, shame-free environment. Helping employees navigate the health system and

linking them with appropriate resources can improve health outcomes for individuals and populations, which is cost effective for all involved.

DNP Essentials

This project provided the author an opportunity to build professional expertise in terms of the DNP Essentials (American Association of Colleges of Nursing, 2006). For example, through designing and implementing the project, the author's health literacy knowledge was enriched, which advanced clinical expertise in the area of health literacy. Moreover, the educator role was elevated as the author mentored other nurses involved in the project and helped them develop their own health literacy expertise (Essential VIII) (American Association of Colleges of Nursing, 2006). Specifically, the training and continuing education program for the UHS clinic staff that prepared them for this DNP health literacy project increased their awareness of health literacy issues and strategies to ameliorate the potential devastating effects of low or limited health literacy (See Appendix J for staff nursing continuing education program lesson plan). Nurses, and particularly DNP-prepared nurses, are well-positioned to lead efforts to identify and address health literacy issues and design and implement patient-centered strategies to reduce health disparities and help improve health outcomes for all patients (Cornett, 2009). The findings of this project support the recommendation that the organization consider adopting "Health Literacy Universal Precautions" to become both a "Health Literate Care Organization" and "Health Literate Workplace" to potentially improve individual, group, and population health and occupational health outcomes (Brach et al., 2012; DeWalt et al., 2010; Koh et al.,2013: Wong, 2012).

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Figure 1. Health Literate Care Model

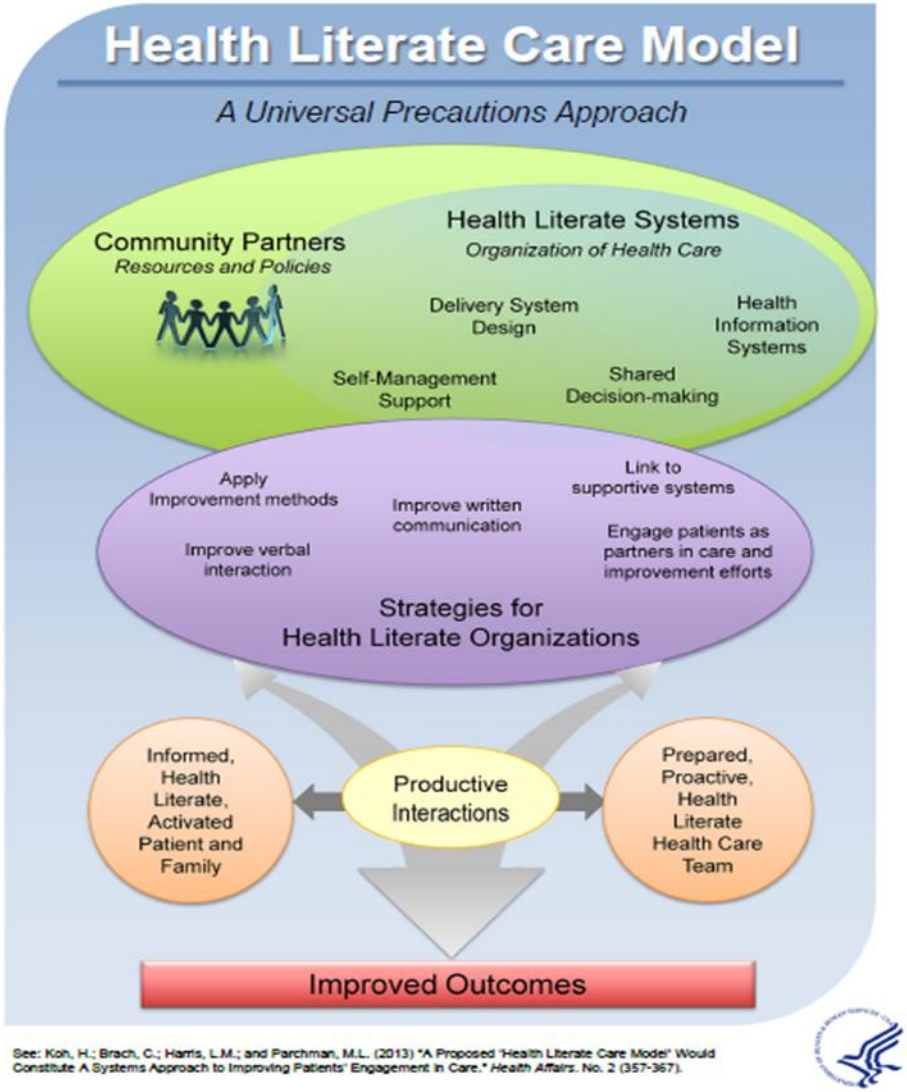

Figure 1. ***Health Literate Care Model*** accessed at http://www.health.gov/communication/interactiveHLCM/#resources, adapted from "A proposed 'Health Literate C are Model' would constitute a systems approach to improving patient's engagement in care." by H. Koh, C. Brach, L.M. Harris, and M.L. Parchman, 2013, *Health Affairs 32, 2*, 357-367.

Table 1

Distribution of age, score, education level, time to complete NVS

	N	Mean	STD	Median	Minimum	Maximum
Age	120	36.73	13.31	34.00	19.00	74.00
NVS Score	120	4.76	1.32	5.00	0.00	6.00
Education (years)	120	16.62	2.60	16.00	12.00	24.00
Time (minutes)	119	1.97	0.55	1.94	1.07	3.35

Note. STD = standard deviation

Table 2

Socio-demographic Characteristics of UHS Sample

Characteristic (n = 120)		
Age, mean (SD), years	36.73 (13.31)	Range (19 – 74)
Gender, n (%)		
Male	56 (46.67%)	
Female	64 (53.33%)	
Native language, n (%)		
Non-English	13 (10.83%)	
English	107 (89.17%)	
Education, formal, mean (SD), years	16.6 (2.60)	Range (12 – 24)
Job title, n (%)		
Medical	52 (43.33%)	
Non-medical	68 (56.67%)	
Employment status, n (%)		
New	23 (19.17%)	
Existing	97 (80.83%)	

Table 3

Distribution of NVS Score and Score Classification

	N	%
NVS Score		
0	2	1.67
1	1	0.83
2	4	3.33
3	13	10.83
4	19	15.83
5	39	32.50
6	42	35.00
Score Classification		
Limited (0-1)	3	2.50
Possibly Limited (2-3)	17	14.17
Likely Adequate (4-6)	100	83.33

Table 4

Pearson product-moment Correlations between Score, Time, Age, and Education

Variable	NVS Score	Time (min.)	Age	Education
NVS Score	1			
Time to complete	-0.43***	1		
Age	-0.26**	0.33***	1	
Education years	0.17~	-0.11	0.03	1

Note. N = 120

~ $p \leq .10$. * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Table 5 Employment Status Differences of On-Average Groups Differences in NVS Score and Time

			Existing		New				
Variable	**Sample Size**	**Overall Mean (STD)**	**N**	**Mean (STD)**	**N**	**Mean (STD)**	**Difference Between Means (95% CI)**	**P Value**	**Effect Size (Cohen's d)**
NVS Score	120	4.8 (1.3)	97	4.7 (1.3)	23	5 (1.3)	-0.4 (-1, 0.3)	0.25	0.3
Time on NVS	119*	2 (0.5)	96	2 (0.6)	23	1.9 (0.5)	0.1 (-0.2, 0.3)	0.69	0.1

* One participant was legally blind and was unable to read the label for NVS tool administration

Table 6 Gender Differences of On-Average Groups Differences in NVS Score and Time

			Male		Female				
Variable	**Sample Size**	**Overall Mean (STD)**	**N**	**Mean (STD)**	**N**	**Mean (STD)**	**Difference Between Means (95% CI)**	**P Value**	**Effect Size (Cohen's d)**
NVS Score	120	4.8 (1.3)	56	4.7 (1.4)	64	4.8 (1.2)	-0.1 (-0.6, 0.4)	0.73	0.1
Time on NVS	119*	2 (0.5)	55	1.9 (0.6)	64	2 (0.5)	-0.1 (-0.3, 0.1)	0.17	0.3

* One participant was legally blind and was unable to read the label for NVS tool administration

Table 7 Job Type Differences of On-Average Groups Differences in NVS Score and Time

			Medical		Not Medical				
Variable	**Sample Size**	**Overall Mean (STD)**	**N**	**Mean (STD)**	**N**	**Mean (STD)**	**Difference Between Means (95% CI)**	**P Value**	**Effect Size (Cohen's d)**
NVS Score	120	4.8 (1.3)	52	5 (1.1)	68	4.6 (1.4)	0.4 (-0.1, 0.9)	0.11	0.3
Time on NVS	119*	2 (0.5)	52	1.9 (0.6)	67	2 (0.6)	-0.1 (-0.3, 0.1)	0.29	0.2

* One participant was legally blind and was unable to read the label for NVS tool administration

Table 8. Language Differences of On-Average Groups Differences in NVS Score and Time

			Not English		English				
Variable	**Sample Size**	**Overall Mean (STD)**	**N**	**Mean (STD)**	**N**	**Mean (STD)**	**Difference Between Means (95% CI)**	**P Value**	**Effect Size (Cohen's d)**
NVS Score	120	4.8 (1.3)	13	3.8 (1.2)	107	4.9 (1.3)	-1.1 (-1.9,-0.4)	<0.01**	0.9**
Time on NVS	119*	2 (0.5)	13	2.4 (0.6)	106	1.9 (0.5)	0.5 (0.1, 0.8)	<0.01**	0.9**

* One participant was legally blind and was unable to read the label for NVS tool administration

Appendix A:
Health Literacy Project Protocol (as submitted to the OSU IRB)

Research Protocol: Health literacy assessment of university employees using the Newest Vital Sign (NVS) tool

I. Objectives:

The purpose of this doctorate of nursing practice (DNP) quality improvement project is to assess the baseline level of health literacy in a sample of Ohio State University (OSU) employees using the Newest Vital Sign (NVS) tool.

II. Background and Rationale:

Health literacy has been defined as the ability to obtain, process, communicate, and understand basic health information and services in order to make appropriate health decisions (Affordable care act.2014; U.S. Department of Health and Human Services, 2008). Research has consistently shown dire consequences for individuals and society if health literacy is not achieved (Mancuso, 2009). Over twenty years of research shows that health information is presented in a way that is not usable by most Americans. Almost 9 out of 10 adults have difficulty using routinely available health information from our health care systems, media, retailers, and community agencies (Kutner, Greenberg, Jin & Paulsen, 2006; U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion, 2010). Limited health literacy is associated with poorer health outcomes and poorer use of health services versus individuals and populations with adequate health literacy (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011). Health literacy is a better predictor of health status than age, income, race, employment status, ethnicity, or educational level (Kutner et al., 2006). Limited health literacy is so common that Heinrich (2012) advocates considering assessment as a "sixth vital sign" in all clinical practice settings (Heinrich, 2012). The National Occupational Research Agenda (NORA) has identified workers with poor literacy skills as a population with more risk for a higher incidence of injuries, illness and fatalities (Parks, Chikotas, & Olszewski, 2012). Improving the health literacy of the population is the first objective in the Health Communication and Health Information Technology section of Healthy People 2020 (U.S. Department of Health and Human Services, 2014). Health literacy is essential for full patient engagement, sound decision-making, and self-management activities and should be woven into all aspects of health system planning and operations (Koh, Brach, Harris, & Parchman, 2013). If all patients are approached as if they are at risk for not understanding their health conditions or treatment plans and then evaluated as to their understanding of the information provided, patient health outcomes may be improved (Koh et al., 2013). The Institute of Medicine (IOM) has recommended that making the commitment to become a "Health Literate Health Care Organization" will not only help the 77

million people who have limited health literacy but also anyone else who may have difficulty accessing, navigating, or successfully using health services (Brach et al., 2012). We do not know the health literacy level of OSU employees. Knowing the level of health literacy in our employees can help us better coach and create programming to help individuals and groups improve their personal and occupational health outcomes.

III. Procedures

A. Project Design

This descriptive project will use an observational, cross-sectional, one time survey design with a convenience sample of new and existing Ohio State University (OSU) employees who visit University Health Services (UHS) for onboarding, routine care, or medical surveillance activities.

B. Sample

All adult OSU employees, age 18 or older, who present to the UHS clinic for post-offer screening or medical surveillance activities, are potential subjects. Minor employees, age less than 18 years, will be excluded due to potential issues with legal consent. Employees who are presenting to the clinic for care of an acute injury or illness will be excluded to prevent delays in prompt urgent care provision. Potential subjects will be approached by front desk personnel at the end of the check-in process using a scripted invitation and flyer informing them of the opportunity to participate in the voluntary survey. Sample size will be determined by the number of subjects consenting and able to participate in the study during the times the investigator is collecting data at the UHS clinic (1-2 days/week for approximately 16 weeks, maximum N =175).

C. Measurement/Instrumentation

The NVS is a bilingual screening tool developed by Weiss, for Pfizer Inc. that identifies patient risk for low or limited health literacy that is based on interpreting an ice cream nutrition label and can be administered in approximately three minutes in a clinical setting (www.pfizerhealthliteracy.com, 2011). The six-question tool was developed by Weiss et al. (2005) as a quick, accurate screening tool for identifying limited health literacy for clinical use with English and Spanish-speaking patients. The NVS was compared and found to correlate with the longer established TOFHLA (test of functional health literacy assessment) tool. Internal consistency was established using Cronbach's alpha (α =0.76), criterion validity (r = 0.59) with area under the ROC (receiver operating curve) of 0.88 for the English version (Weiss et al., 2005), (Mancuso, 2009). Scoring 0-1on the NVS suggests a high chance of limited health literacy, 2-3 suggests possible limited literacy, and 4-6 almost always indicates adequate literacy (www.pfierhealthliteracy.com, 2011).

D. Detailed study procedures

A one-time observational cross-sectional survey study project using the NVS tool will be used to evaluate the health literacy level of a sample of employees seeking onboarding or surveillance services at an outpatient metropolitan university clinic. Verbal informed consent will be obtained from patients wishing to participate in the project by the co-investigator using a scripted verbal explanation of the study after time allotment for questions. (Verbal consent is preferred so that no project documents contain the participant's name). Participants will be informed they can withdraw from the study at any time without penalty. [See scripts for front desk staff (informing of project) and co-investigator (recruitment and consent). The participant may keep the project flyer that contains co-investigator and Office of Responsible Research contact information]. The consent of subjects, collection of demographic information, administration and scoring of the NVS tool, and data management will be performed by the co-investigator. The co-investigator will pilot the project procedures, including administration of the NVS tool, with coworkers and peers prior to implementing the study. Training for use of the NVS tool is found in the implementation guide available on the Pfizer NVS toolkit website (www.pfierhealthliteracy.com, 2011). Front desk staff will be trained to use the notification of project script by the co-investigator.

Each employee checking in to the UHS clinic for onboarding or medical surveillance will be informed of the opportunity to participate in the study by front desk staff using a scripted invitation. Employees who express interest in participating will be given an informational flyer and be directed to see the co-investigator seated in the waiting area for further information.

The co-investigator will take the potential subject to a private interview area to explain the study, allow time for questions, and obtain verbal informed consent from interested individuals. Then the co-investigator will collect demographic data via interview and record on the health information data collection form, and administer the NVS tool. Only general demographic information (age, gender, native language, years of education, job title, whether new or existing employee), NVS score, and time for NVS tool administration will be recorded. The data collection form and NVS scoring sheet will be stapled together and placed in an envelope that will be kept in a locked drawer at the clinic until data entry into a Microsoft Access database (which will be encrypted and password protected). . At the time of data entry, a unique identification number will be automatically assigned to the data set for each individual participant. Any data transfers will be encrypted. Any hard copies of data will be shredded upon study completion or as per established College of Nursing and university policies. Demographic and NVS data will be used for data analysis. Based on current clinic volume statistics, previous survey initiatives and investigator availability for data collection, 8-10 subjects per day are expected to participate in the study.

In addition to seeking OSU IRB approval for the study, the project proposal has been submitted to UHS medical and administrative leaders and the OSU human resources administration for review. It is predicted that data collection can be completed within a 14-week timespan (academic semester) and that data analysis and interpretation of the findings can be completed within an additional 14-week timespan. If there are unanticipated issues with recruitment efforts in the UHS, an alternate site could be considered. This is a descriptive, feasibility project evaluating the use of the NVS tool in an employee population, thus data collected from any cross-section sample would provide valuable information.

There is a minimal risk of a confidentiality breech that will be minimized by protocol safeguards. Determining the level of health literacy in a sample of OSU employees and testing the feasibility of using the NVS in practice may inform the development of more effective coaching techniques and programming to help individuals and groups improve their personal and occupational health outcomes.

E. Data Analysis

Demographic data (age, gender, native language, education level, job title and whether the employee is new or an existing employee) will be requested during the participant interview and recorded on a paper data collection form. The demographic and NVS data for each subject will be entered into a Microsoft Access database by the investigator and secured per OSU data security policy. Data will be summarized in tables and descriptive statistics will be used for analysis (e.g. cross table tabulations and Chi square analysis).

Appendix B:

Front desk script

Script for front desk staff informing employees about the opportunity to participate in the project (Pre-project)

I would like to let you know about a research project to help us develop better ways to present health information to our employees. Participation in this research project is totally voluntary and is not part of your _____ (medical surveillance, post-offer screening, or routine office) visit. Your participation in this project will take about 6 minutes. If you are interested in learning more about the project, please see Nurse Practitioner Karl in that corner of the waiting room. (Hand flyer to potential participant).

Appendix C:

Health Information Project Flyer

Health Information Research Project

You are invited to take part in a research project that will help us develop better ways to present health information to our employees. This project will take 5-8 minutes of your time. It is not part of your medical appointment today. The project is totally voluntary. You will be asked a few general questions about you. Then you will be asked to look at some health information and answer a few questions about that information.

This project is part of my doctoral study in nursing. If you are interested in participating, feel free to see me in the waiting room for additional information about the project.

Thank you.
Joyce Karl
Adult Nurse Practitioner and Associated Faculty – Clinical
The Ohio State University College of Nursing
Karl.3@osu.edu
614-530-8973

*For any questions about your rights as a participant in this study or to discuss other study-related concerns or complaints you may contact the Principle Investigator, Dr. Jodi McDaniel, Associate Professor, The Ohio State University College of Nursing at 614-292-1345 or email: mcdaniel.561@osu.edu.

*For any additional questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6251.

Appendix D:

Project eligibility

Project Eligibility/ineligibility criteria

Eligible:
OSU employee, age 18 or older
Presenting to UHS clinic for non-urgent appointment, post-offer screening, or medical surveillance

Not eligible:
Minor OSU employee (age less than 18)
Contracted service or other non-employee
Presenting for emergent or urgent care of an injury or acute/infectious illness

Appendix E:

Script for Co-investigator

Script for Co-investigator requesting participant consent for administration of the NVS tool and participation in the project (In waiting room)

Hi, my name is Joyce Karl. I am a nurse practitioner and faculty member at the College of Nursing. Are you interested in participating in a research project about health information? Let's go to another area where we can talk privately and I can give you more information.

(In private office space)

This project is part of my doctoral study in the college of nursing. The goal of the project is to determine better ways to present health information to our employees so that the information will be more clearly understood. Your participation in the project involves looking at some health-related information in a quiet, private room and then answering a few questions about what you have seen. This part will take about 3 minutes. The specific purpose of this project is to assess how well patients understand and use health information from a product label.

I will also ask you a few more questions that will help us evaluate the results. This part will take about 2 more minutes. The information you provide will not to be linked to you and the results will only be reported for groups. Participation in this project is voluntary. There is no direct benefit to you for participating, but your answers may benefit others because we will use the findings of this project to develop better methods to present health information. There is no penalty for not participating in the project. If you do agree to participate, you can stop at any time, without penalty. You may also skip any questions you are not comfortable answering. There are no significant risks to you for participating in this project. Do you have any questions? Are you interested in participating in this project?

Appendix F:

Data Collection Form

Health Information Data Collection Form (for use by Co-investigator)

Age:

Gender:

Native language:

Total years of formal education:

Job title:

New or Existing Employee

Time for NVS tool administration:

Appendix G: NVS Instructions

The Newest Vital Sign
A Health Literacy Assessment Tool

Dear Healthcare Professional:

Thank you for your interest in the Newest Vital Sign (NVS), the first tool available to assess health literacy in English and Spanish.

Research shows that patients with low health literacy are less likely to comply with prescribed treatment and medical instructions from their physician. Identifying patients who are at risk for low health literacy allows physicians to apply specific clear health communication techniques that may enhance understanding. The Newest Vital Sign is a simple and fast way to identify those patients. The tool, which tests literacy skills for both numbers and words*, has been validated against a previously validated measure of health literacy (the TOFHLA), and has been shown to take approximately three minutes to administer.

In addition to the NVS tool, we are also including information to help enhance patient-provider communication. In this folder you will find the following materials:

- NVS Tool (nutrition label and scoring sheet tear-off pad, both two-sided in English/Spanish)
- NVS Implemenation Guide
- *Ask Me 3* (fact sheet on free educational materials from the non-profit Partnership for Clear Health Communication)
- *Help Your Patients Succeed* (tips for improving communication with your patients)
- *Why Does An Ice Cream Label Work . . .* (fact sheet explaining the design of the NVS)

The Newest Vital Sign is Pfizer Inc's most recent contribution to the health literacy movement. For more than nine years, Pfizer has been committed to raising awareness of developing solutions for low health literacy. The overall goal of our Clear Health Communication Initiative is to positively impact the health care system by enhancing patient-provider communication to increase compliance and improve patient health outcomes.

The Newest Vital Sign and companion materials are available to medical and public health providers at no cost. To learn more about our efforts to improve health literacy, please visit www.pfizerhealthliteracy.com.

Sincerely,

Richard C. Hubbard, M.D.
Senior Director, External Medical Affairs
Pfizer Inc

*Literacy is defined as the understanding and application of words (prose), numbers (numeracy), and forms, etc. (document).

Implementation Guide for the Newest Vital Sign

Health literacy— the ability to read, understand and act upon health information — is now known to be vital to good patient care and positive health outcomes. According to the Institute of Medicine's groundbreaking report on health literacy, nearly half of all American adults — 90 million people — have difficulty understanding and using health information. When patients lack the ability to understand and act upon medical information, it can put their health at risk.

The Newest Vital Sign is a new tool designed to quickly and simply assess a patient's health literacy skills. It can be administered in only 3 minutes and is available in English and Spanish. The patient is given a specially designed ice cream nutrition label to review and is asked a series of questions about it. Based on the number of correct answers, health care providers can assess the patient's health literacy level and adjust the way they communicate to ensure patient understanding.

There are many ways to integrate the Newest Vital Sign (NVS) into a private practice or clinic setting to improve communication with patients. Improved communication can help increase your patients' ability to understand and act upon the information you provide; ultimately improving patient satisfaction and health outcomes.

How To Use the Newest Vital Sign

1. **Who and when to administer the Newest Vital Sign.**
   - **A nurse (or other trained clinic staff)** is the preferred administrator of the Newest Vital Sign.
   - Administer at the same time that other vital signs are being taken.
2. **Ask the patient to participate.**
   A useful way to ask the patient is an explanation similar to this:
   "We are asking our patients to help us learn how well patients can understand the medical information that doctors give them. Would you be willing to help us by looking at some health information and then answering a few questions about that information? Your answers will help our doctors learn how to provide medical information in ways that patients will understand. It will only take about 3 minutes."
3. **Hand the nutrition label to the patient.**
   The patient can and should retain the nutrition label throughout administration of the Newest Vital Sign. The patient can refer to the label as often as desired.

More...

4. **Start Asking the 6 questions, one by one, giving the patient as much time as needed to refer to the nutrition label to answer the questions.**
    - There is no maximum time allowed to answer the questions. The average time needed to complete all 6 questions is about 3 minutes. However, if a patient is still struggling with the first or second question after 2 or 3 minutes, the likelihood is that the patient has limited literacy and you can stop the assessment.
    - **Ask the questions in sequence.** Continue even if the patient gets the first few questions wrong. However, **if question 5 is answered incorrectly, do not ask question 6.**
    - **You can stop asking questions if a patient gets the first four correct.** With four correct responses, the patient almost certainly has adequate literacy.
    - **Do not prompt patients who are unable to answer a question.** Prompting may jeopardize the accuracy of the test. Just say, "Well, then let's go on to the next question."
    - **Do not show the score sheet to patients.** If they ask to see it, tell them that "I can't show it to you because it contains the answers, and showing you the answers spoils the whole point of asking you the questions."
    - **Do not tell patients if they have answered correctly or incorrectly.** If patients ask, say something like: "I can't show you the answers till you are finished, but for now you are doing fine. Now let's go on to the next question."
5. **Score by giving 1 point for each correct answer (maximum 6 points).**
    - **Score of 0-1** suggests high likelihood (50% or more) of limited literacy.
    - **Score of 2-3** indicates the possibility of limited literacy.
    - **Score of 4-6** almost always indicates adequate literacy.

Record the NVS score in the patient's medical record, preferably near other vital sign measures.

Best Practices for Implementation: Summary

- A nurse (or other trained clinic staff) is the preferred administrator of the Newest Vital Sign.
- Administer the NVS at the same time that the patient's other vital signs are being taken.
- Record the NVS score in the patient's chart, preferably near other vital sign measures.
- Tailor communication to ensure patient understanding.

Why Does an Ice Cream Label Work as a Predictor of the Ability To Understand Medical Instructions?

A patient's ability to read and analyze any kind of nutrition label requires the same analytical and conceptual skills that are needed to understand and follow a provider's medical instructions. The skills, which are known as *health literacy,* are defined as the understanding and application of words (prose), numbers (numeracy), and forms (documents).

The use of an ice cream label is especially relevant as recent research in the *American Journal of Preventive Medicine* (November 2006) has shown that poor comprehension of food labels correlated highly with low-level literacy and numeracy skills. However, the study found that even patients with better reading skills could have difficulties interpreting the labels.

Whether reading a food label or following medical instructions, patients need to:

- remember numbers and make mathematical calculations.
- identify and be mindful of different ingredients that could be potentially harmful to them.
- make decisions about their actions based on the given information.

PROSE LITERACY:
Clinical example: The patient has scheduled some blood tests and is instructed in writing to fast the night before the tests. The skill needed to follow this instruction is **Prose Literacy.**

Ice cream label example: The patient needs this skill to read the label and determine if he can eat the ice cream if he is allergic to peanuts.

NUMERACY:
Clinical example: A patient is given a prescription for a new medication that needs to be taken at a certain dosage twice a day. The skill needed to take the medication properly is **Numeracy.**

Ice cream label example: The patient needs this same skill to calculate how many calories are in a serving of ice cream.

DOCUMENT LITERACY:
Clinical example: The patient is told to buy a glucose meter and use it 30 minutes before each meal and before going to bed. If the number is higher than 200, he should call the office. The skill needed to follow this instruction is **Document Literacy.**

Ice cream label example: The patient needs this skill to identify the amount of saturated fat in a serving of ice cream and how it will affect his daily diet if he doesn't eat it.

Appendix H:

NVS Nutrition Label

Nutrition Facts

Serving Size	½ cup
Servings per container	4
Amount per serving	
Calories 250	Fat Cal 120
	%DV
Total Fat 13g	20%
Sat Fat 9g	40%
Cholesterol 28mg	12%
Sodium 55mg	2%
Total Carbohydrate 30g	12%
Dietary Fiber 2g	
Sugars 23g	
Protein 4g	8%

*Percentage Daily Values (DV) are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

Ingredients: Cream, Skim Milk, Liquid Sugar, Water, Egg Yolks, Brown Sugar, Milkfat, Peanut Oil, Sugar, Butter, Salt, Carrageenan, Vanilla Extract.

Appendix I: NVS Score Sheet

The Newest Vital Sign

Score Sheet for the Newest Vital Sign Questions and Answers

READ TO SUBJECT:
This information is on the back of a container of a pint of ice cream.

1. If you eat the entire container, how many calories will you eat?
   Answer: *1,000 is the only correct answer*

2. If you are allowed to eat 60 grams of carbohydrates as a snack, how much ice cream could you have?
   Answer: *Any of the following is correct: 1 cup (or any amount up to 1 cup), half the container. Note: If patient answers "two servings," ask "How much ice cream would that be if you were to measure it into a bowl?"*

3. Your doctor advises you to reduce the amount of saturated fat in your diet. You usually have 42 g of saturated fat each day, which includes one serving of ice cream. If you stop eating ice cream, how many grams of saturated fat would you be consuming each day?
   Answer: *33 is the only correct answer*

4. If you usually eat 2,500 calories in a day, what percentage of your daily value of calories will you be eating if you eat one serving?
   Answer: *10% is the only correct answer*

READ TO SUBJECT:
Pretend that you are allergic to the following substances: penicillin, peanuts, latex gloves, and bee stings.

5. Is it safe for you to eat this ice cream?
   Answer: *No*

6. (Ask only if the patient responds "no" to question 5): Why not?
   Answer: *Because it has peanut oil.*

	ANSWER CORRECT?	
	yes	no
Q1		
Q2		
Q3		
Q4		
Q5		
Q6		
Number of correct answers:		

Interpretation

Score of 0-1 suggests high likelihood (50% or more) of limited literacy.
Score of 2-3 indicates the possibility of limited literacy.
Score of 4-6 almost always indicates adequate literacy.

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Appendix J:

"Assessing Health Literacy" continuing nursing education offering lesson plan

Lesson Plan – Addendum # 1 Faculty Directed Activity

Use to provide information on Criteria E, F, G, and H

Program No.: 2016-2125 Total allowable minutes 60 /60 = Contact Hours

Objectives	Content (Topics)	Time Frame	Presenter	Methods
Describe the health literacy problem in the U.S. and implications for health professionals.	2003 National Assessment of Adult Learning (NAAL) Survey and Survey of Adult Skills (PIAAC) A. Statistics and demographics B. You tube video clip " AMA Health Literacy - short version" http://www.youtube.com/watch?v=BgTuD7l7LG8 C. Healthy People 2020, Institute of Medicine (IOM), Joint Commission (JC), Dept. of Health and Human Services (DHHS),and Affordable Care Act (ACA) recommendations to address health literacy	10 minutes	J. Karl, CNP, COHN-S	**Teaching Method:** Discussion, Lecture, PowerPoint, video clip **Evaluation Categories:** Process Evaluation
Discuss the evidence r/t the impact of low or limited health literacy on health outcomes, access, health behaviors, and health costs.	Health literacy is a stronger predictor of health status than age, income, race, ethnicity, education level, or employment status A. Key studies B. Systematic reviews C. Occupational health literacy concepts	15 minutes	J. Karl, CNP, COHN-S	**Teaching Method:** Discussion, Lecture, PowerPoint **Evaluation Categories:** Process Evaluation
Describe the use of the Newest Vital Sign (NVS) tool to assess health literacy in patients.	NVS flipbook (by Pfizer, developed by Weiss) A. NVS tool administration B. NVS scoring	10 minutes	J. Karl, CNP, COHN-S	**Teaching Method:** Discussion, Drill & Practice, PowerPoint **Evaluation Categories:** Process Evaluation
Describe strategies/solutions to address the mismatch between health literacy level and the levels of most health materials and forms.	Attributes of a Health Literate Health Care Organization/Workplace A. Health Literacy Universal Precautions Toolkit B. Individual cues and actions C. Materials and forms D. Available resources E. Additional strategies and examples	25 minutes	J. Karl, CNP, COHN-S	**Teaching Method:** Discussion, Lecture, PowerPoint, Q&A **Evaluation Categories:** Process Evaluation